

Summary of Comments on January 2010 draft of Strategic Science Plan

Commenters

- Ron Thom, Pacific Northwest National Laboratory's Marine Science Laboratory
- City of Seattle staff
- The Nature Conservancy
- Washington Sea Grant
- Ecology
- Common Sense Alliance
- Kathleen Wolf, UW & US Forest Service
- Kristen Byrd, USGS

Summary of comments

Commenters expressed support for the draft plan's general approach (ecosystem-based, using an adaptive management framework, science-policy engagement), scope, and many of the details. One commenter offered fundamental criticisms of the writing and an underlying bias (e.g., emphasis on adaptive management, collaborative rather than local decision making). Key ideas from 30+ pages of comments are identified below.

General suggestions

- Develop the document more fully as a strategy (e.g., by identifying the key hurdles that will be faced and the resources and opportunities)
- Shift focus from process to science
- Place priority on science to inform management actions; refer to decisions that would be affected by science efforts
- More purposefully include social science as part of the science activities
- Use overall synthesizing diagram to illustrate relationships between various elements of science capacity (e.g., how does progress in one element feed to another document)
- Recognize and distinguish U.S. watershed and larger Puget Sound/Georgia Basin

Discussion of the system

- Describe human health more clearly as a social and environmental justice issue
- Express more clearly balances in quality of life factors
- Discuss social and economic factors as separate entities rather than stressors; establish a framework for integrating human and ecological systems
- Address issue of land ownership and how ownership and land use intersect with science and research needs and access to information

Capacity and Coordination

- Provide more explicit documentation of the strategy for integrating existing, ongoing scientific investigation.
- Define who will be involved in various processes (who are stakeholders? How are they involved in integrated ecosystem assessment? In open standards?) Consider organizing and supporting independent science teams
- Develop and characterize capacities that recognize a balance between top-down and bottom-up approaches
- Engage in long-term capacity building with academia and/or the private sector to bring Partnership science priorities into long-term research programs

Adaptive management

- Provide more detail (i.e., in a diagram) of adaptive management process
- Detail the steps of the Open Standards process and differentiate conceptual models and results chains
- Clarify relationship between Open Standards and Integrated Ecosystem Assessment and role of modeling and other studies as elements in the IEA framework
- Clarify models as central organizing tool for adaptive management
- Extend discussion of adaptive management and uncertainty

Monitoring

- Clarify the need for long-term, stable funding for monitoring and other elements of a strategy for monitoring
- Describe a Partnership role in facilitating a collaborative approach to project monitoring

Modeling

- Consider a modeling grant program to promote integration and continuation of modeling programs
- Focus modeling on decision support (not just scientific understanding)
- Describe how modeling and monitoring will be integrated

Information Management

- Articulate a strategy for data management that is scaled to fit (budget, schedule, organizational capacity)
- Describe how collective regional knowledge will be maintained and exchanged; add detail about how (e.g., through MOUs) to coordinate and provide access to data

Research

- Develop and describe a research strategy that balances immediate priorities and longer term needs and focuses on the intersection of basic and applied science
- Work with Sea Grant to identify mechanisms for improving coordination of research priorities and funding decisions

Peer Review

- Further explain role of peer review and the continuum of review and validation techniques

Outreach and Education

- Articulate a stronger link between Partnership and local decision makers (e.g., technical assistance to decision makers and residents as an element of outreach and education)
- Include communication of high-level results of funded studies

Review of PSP Strategic Science Plan, January 2010 Review Draft
R. Thom (Marine Science Laboratory, PNNL), 6 April 2010

General – This is a comprehensive and well-written document. It covers all of the major topics I would expect in a high-level strategy. Below are specific comments:

- I am fully in favor the ecosystem-based approach and the Salish Sea seems like the right ecosystem scale to work at.
- The concept of conducting science within and adaptive management framework is right in my opinion. Using Williams et al as a guide is fine. However, I was looking for a figure that illustrated the process that is described in the text. Figure 4 helps but again is very general. No one can disagree. I think the framework concept could be made more clear by providing the specifics of PSP's decision process in terms of making decisions, and highlighting where basic research, models, effectiveness monitoring, cumulative effects assessments, etc. enter into the process.
- Modeling is mentioned several times, but it should be clarified that in AM a model can be the central organizing tool. The model is used to predict the outcome of actions, and monitoring and research improves the predictions. In this way actions can be refined to be more efficient in producing positive results. Further, actions can be effectively prioritized relative to the goals for the program. The IEA is probably that central model, but I am not sure that the UEA has been designed to serve that purpose. If the IEA is not the central model, then what model is being used to predict the outcome of actions?
- The Principle Science Products seem correct, but what serves as the program "Report Card"? Perhaps the State of the Sound report would be where the metrics, performance criteria, and triggers are defined and tracked. This way the report can determine if the criteria are being met or not. And can address the reasons why the criteria are not met. In addition, this would lead to recommendations as well as identifying key uncertainties that need to be studied. The Puget Sound Update would provide a higher level of discussion regarding ecosystem health relative to the program vision and goals.
- Decisions are not well defined. If this is a strategic plan, then there must a decisions that demand action...this is critical to AM also. What are the decisions? Also if structured decision-making is going to be done, decisions and uncertainties need to be defined.
- Stakeholders are not well defined. Who are they and where do they fit into the process. Will they define the vision? Will they make decisions at some level? What information will they receive? How with the science be communicated?

- It would be wise to link clearly the elements of the program with national and international programs. For example, NOAA's Estuarine Eutrophication Program has a set of metrics applied to all of the US. However, right now its very difficult for Puget Sound scientists to cull out how the Sound is doing using these metrics because many of them are not studied or are not studied in the right locations. Climate change is another national and international issue. It would be useful to be able to report on how PS is doing using internationally unified metrics. The NRC published a set of ecosystem health indicators. The Puget Sound program should attempt to report back on those nationally recommended indicators.

Finally, I am very pleased to see this document. It correctly characterizes Puget Sound science as uncoordinated and piecemeal. The document portrays the complexity and enormity of pulling together a much more effective science program for the Sound. Part of this complexity comes from the massive number of issues facing the Sound. The large number of proposals submitted to the recent EPA call testifies to the vacuum created by a lack of focused research funds and the pent up mass of science needs.

April 7, 2010

To: Puget Sound Partnership Science Panel and Staff

From: Susan Saffery, City of Seattle

Subject: City of Seattle Staff Comments on the Draft Strategic Science Plan

Thank you for the opportunity to review and comment on the draft science plan. The comments below were provided by scientists and professional staff from Seattle City Light, Seattle Public Utilities, and the Department of Planning and Development. As you will see, there was a diversity of opinions about the draft document. Recognizing that it is important for you to receive feedback from a variety of viewpoints and rather than try to come to consensus amongst ourselves, the comments generally stand as provided by our staff.

General Comments

Overall, most of our staff feel the document is well written, heading in the right direction and useful in developing a framework for pursuing Puget Sound Science. We commend the Panel for a good start on developing a science strategy for Puget Sound. The report begins with a solid, if brief, overview of the Puget Sound environment, coupled with identification of important things to consider in developing a strategy. We feel that the product falls short, however, in the actual development of the strategy. It could do more to identify the key hurdles that will be faced – also to describe key existing resources and opportunities to mobilize them. This work could be characterized as the development of criteria answering questions such as:

- What are the areas of greatest uncertainty? At what time and spatial scales?
- What are the areas of greatest risk? I.e. to ecological processes, ecosystem services, economic outcomes.
- What resources and technologies are available to understand these elements of risk and uncertainty? How can we best manage or direct them?
- What are the decisions that greater science understanding will inform?

We also have concerns that this framework is too focused on process instead of science. The emphasis on a formalized decision-making processes, involving lengthy meetings devoted to process and procedures, which will likely discourage many of the regions scientists from engaging in this proposed plan.

The goal of this draft strategy seems more driven by process considerations than by science. A more technically focused goal could be: “improve our scientific knowledge of the impacts of

humans on the Puget Sound ecosystem; identify the threshold to which these impacts can be tolerated by the ecosystem; and predict the future condition of the ecosystem if current human development patterns remain unchanged”

The primary role of scientists under the strategy should be answer key questions regarding the health of the Puget Sound ecosystem, and to indentify and quantify the “cause and effect” relationships between a wide variety of human impacts and key indicators of ecosystem health (e.g., marine benthic diversity; distribution and abundance of salmon). It is then up to the policy makers, environmental planners, politicians to decide what levels of ecosystem diversity, integrity, and health are desired by the citizens of the Puget Sound, and how to best achieve these objectives considering monetary, political, and regulatory constraints.

Land Use and Land Ownership

We suggest that the document is largely missing and should include more specific discussion about the critical issue of land ownership (i.e., private vs. public) and land uses in Puget Sound and how that intersects with much of the science and research needs and information that are presented here. This is a relatively simple data management issue --- one high priority data issue is that the Partnership should always having access to a good, current data layer(s) showing land ownership as part of the overall data resources when analyzing other issues, such as location of certain species, habitats, shoreline conditions, etc. But it also a very complex issue related to the discussion in the document regarding how human beings are interacting with these resources and ultimately how feasible, realistic and costly many of the restoration opportunities that are identified in our scientific studies and analyses will be. It’s also an issue that often gets ignored or little mention in the science-oriented discussions about Puget Sound recovery, but that is a mistake.

Below are underlined sections from the document where this issue is particularly relevant, but there are others - and it is really a fundamental issue relevant to just about everything discussed.

Section 4.3 (p. 23)

Science capacity in monitoring, modeling, data management and research already exists to various degrees in diverse Puget Sound organizations, but perhaps not at the scale, nor with the degree of integration needed to meet Partnership goals. Without the development of new natural and social science capacity, the scientific abilities identified in this plan cannot be fully achieved. In addition, strong coordination and cross-communication is necessary to assure that these science capabilities work in a mutually supportive, integrated fashion.

Section 4.3.3 (p. 28)

Data management must also encompass the capability to analyze and synthesize (convert data to meaningful information) for particular high priority data uses.

Section 4.3.4

2. How can Puget Sound residents, who benefit from and impact the natural system in a wide variety of ways, define a healthy, functioning natural system?

Research needs extend well beyond the natural sciences, to address critical social science questions. Because of the significant diversity in objectives, perceptions and values of Puget Sound regional residents and visitors, determining what defines a healthy functioning natural system will be challenging. To one person (living on a hillside overlooking the Sound with no other direct contact with it) the Sound may appear healthy just as it is. To another person (actively engaged in shellfish harvest) a healthy Sound could be one in which shellfish closures due to pollutant loadings do not occur. In order for the Partnership to proceed on an effective track, analysis is necessary to better understand how people use and relate to the Sound, what incentives lead to stewardship and behaviors to mitigate ecosystem impact, and what tradeoffs people are willing to make if faced with opposing perspectives of what needs to be done to restore the Puget Sound.

3. How has the Puget Sound natural system evolved in response to natural and human induced stressors? How will the Puget Sound continue to change and what will it look like in 2020?

The Puget Sound ecosystem is not static, and will continue to change driven by both natural and human influences. Identifying the drivers that caused prior changes and understanding previous rates of change allow us to build credible predictive capabilities. Unless we project the most likely conditions in 2020, it is not possible to develop effective assessment and restoration strategies. These analyses must address not only natural sciences, but also economics, sociology, and institutional analysis and use all available information to project future conditions, including (1) possible future states where thresholds for multiple objectives are simultaneously met; (2) ecosystem services that may be provided under alternative futures; and (3) the major trade-offs in objectives or ecosystem services under potential future states.

4. What indicators of ecosystem function and human well-being best track Partnership progress towards goals?

Indicators must accurately reflect the key properties of the ecosystem, and be linked through conceptual models to external stresses. For example, levels of chemical contaminants in sediments is only a useful indicator if we understand how and at what threshold level this stressor harms either valued individual species or ecosystem function, or negatively impacts human uses. In both upland and aquatic ecosystems, ecologists have made progress in developing 'lumped' indicators of ecosystem resilience and stability. Others are refining specific processes within conceptual models, providing needed linkages within this complex ecosystem. Applying these indicators and models to the Puget Sound restoration is critical to assessing progress. In short, development of 'indicators' should continue to drive the discussion of what is valued and how individual processes work together to provide ecosystem services.

5. What are the individual and cumulative effects of restoration and protection actions?

The restoration and protection of the Puget Sound is inherently defined by the complex connections and interactions within and between the natural, social, economic, and political systems. Yet, to date a piecemeal approach has been taken, as illustrated by single-species recovery plans. Restoration projects are often at a local scale, and it is unclear how these impact larger spatial regions. We need to better understand how deliberate actions will influence the future conditions in the ecosystem; how effective each contemplated action will likely be on the desired outcome; and what will be the effects on the regional economy and on individual quality of life and health. Actions may be synergistic and mutually beneficial, or may work at cross purposes.

Open Standards

Sections 4.1 and 4.2 of the strategic science plan introduce the Open Standards and Integrated Ecosystem Assessment processes and suggest that these will enhance the process of science and the science/policy dialogue. While some of our staff was interested to learn more about the Open Standards work, it raised concerns with others. To that end, the following comments were provided and suggestions made:

To be accepted in the science community, the plan should provide more details on exactly who will be involved in these processes, how long they will take to complete, the time required by scientists to engage in the process, and how much they will cost. Above all, the plan should provide concrete examples of where these processes have been previously employed (particularly for the protection and restoration of large ecosystems in the U.S.).

A more effective approach would be to organize and support Independent Science Teams (ISTs) that have the goal of: 1) distilling existing science into a comprehensive summary of what is known and not known about the Puget Sound ecosystems; 2) identifying the critical gaps in our scientific knowledge that need to be filled; 3) developing a “top ten” list of questions that need to be answered about human impacts on Puget Sound Ecosystems; 4) refining these questions in consultation with policy makers; 5) design and implement research projects to answer these question; 6) document the results in scientific papers and forums; 7) work with public outreach staff who can act as “scientific interpreters” and convert these results into a form easily understood and accessible by the public. ISTs should be formed for each of the major ecosystem components identified by PSP: 1) human health; 2) human quality of life; 3) species, biodiversity, and foodwebs; 4) habitat and land-use; 5) water quantity; and 6) water quality. These ISTs should work independently of the PSP and other non-scientific workgroups to assure scientific objectivity. These teams should be led by a recognized expert in the subject area, with the team staffed by scientists from academia, tribes, NGOs, and federal, state, and local agencies. The teams should be coordinated by an internationally recognized expert in ecosystem science and restoration.

Monitoring

The Strategic Science Plan recognizes monitoring as a critical component of an ecosystem science plan, and describes how monitoring will be designed, implemented, and coordinated among multiple working groups. The plan should also clearly state that funding for long-term monitoring has scarce and uncertain, and that funding remains the largest constraint to the implementation and success of monitoring programs in the Puget Sound. The implementation of an integrated “ecosystem monitoring system” as proposed by PSP is moot if monitoring is not funded.

Please acknowledge that many monitoring efforts are already underway, through individual projects and watershed-scale groups. The Science Panel needs a clearer strategy, spelled out in space and time, for working with this existing diversity of effort. (pg 24)

Modeling

Section 4.3.2 does a good job describing the value of modeling as an essential “tool” for understanding the current and predicting the future impacts of humans on the Puget Sound ecosystem. However, the proposed “integration” of ecosystem, climate, watershed hydrology, salmon and steelhead life cycle, landscape, and valuation models so that they expanded to a regional basis will require a substantial investment in terms of funding and time. Several ecosystem modeling efforts are now underway that can be ultimately be applied to the entire Puget Sound. Examples include the FV-COM hydrodynamic and water quality model for coastal waters and estuaries being developed by Pacific Northwest National Labs, climate and watershed hydrology models being developed by the UW Climate Impacts Groups, ecotoxicology models, salmon and steelhead life cycle models being developed by the NWFSC, and the integration of ecosystem, salmon life cycle, hydrology, water quality, and climate models being conducted by NOAA and the Skagit Climate Science Coalition. These efforts are being funded on a “piece by piece” basis, and will require substantial funding if they are to be applied to the entire Puget Sound. In this regard, the PSP should consider developing a modeling grant program to promote the integration and continuation of these modeling programs.

Page 11. In describing the **Puget Sound oceanography**, please describe more clearly the salinity and circulation gradients occurring from the Straits to South Sound, and their influence on biota and human impacts to the Sound.

Page 12. In describing the **geophysical context** for Puget Sound science, please acknowledge and distinguish between the U.S. watershed and the larger Puget Sound/Georgia Basin. This is generally important, to recognize of the scope of the ecosystem, and specifically important

because of the large contribution of fresh water to the northern Puget Sound basin from the Fraser River drainage.

Page 15. As the document is characterized as a “strategic plan”, we feel the discussion about uncertainty and **adaptive management** should go further. How will uncertainty be characterized? Within what conceptual framework? What sorts of testable hypotheses will be developed? Who will do this work? If this is “decision support”, what is the nature (i.e. the scope, authority) of the decisions being supported?

Page 22-23. **Science capacity building.** To fulfill the stated intent of the document, please suggest specific strategies for building science capacity. Where, institutionally, should this occur? What is the best balance between top-down and bottom-up science approaches? What comparative roles for public, academic, private, and volunteer science practitioners?

Page 28. **Data management.** Consider that the design of a data management system needs to be scaled to fit within a budget, schedule and, organizational capacity to implement and maintain it. A strategy should be articulated, either to build this incrementally using existing capacities and known methods, or to develop a specific data management system project proposal.

Page 29-31. **Research.** Again, we would appreciate some attention to the balance between top-down and bottom-up processes for advancing science. On the one hand, broad community participation in the science process can be expected to build ownership and consensus around science conclusions. On the other, science is not a process of registering opinions or of voting – it is a process of accumulating and validating evidence. Granted ongoing uncertainties, a diversity of qualified specialists have studied Puget Sound for a long time. Helping to sort and to articulate the considered beliefs of these specialists is one strategy for teeing up future research needs and advancing the science in a predictable and productive manner.

Page 32-34. **Peer Review.** We agree that peer review is vital to validating science information. However, we believe this is a complex issue that requires some further explanation. State and local entities have wrestled with this, for example, in defining Best Available Science, for purposes of implementing GMA provisions. Please do more to describe the continuum of review and validation techniques that will be needed to make full use of available information and generate a consistent “weight of evidence” approach.

Page 37. **Human Health.** This topic should be described more clearly as a social/environmental justice issue. Acknowledge that some human population groups – i.e. Tribal, immigrant, economically disadvantaged - may be at increased risk of exposure, through their location of residence and/or their dietary needs and preferences.

Page 39-40. **Human Quality of Life.** Please discuss more clearly some of the balances in the quality of life factors. For example, traditional land uses such as agriculture and forestry can be performed sustainably, but they can also contribute negatively to habitat and ecosystem processes. Also, shoreline property owners benefit from a healthy Puget Sound, but they also have impacts on water quality, beach habitat, and public access to the shoreline.

Also two specific comments here: p39, next to last sentence, is this “80% of Washington State tourism revenue is generated from Puget Sound”? p. 40 the second “additional information” bullet is rather obscure.

Water Quality: Puget Sound Marine and Freshwater are Clean (Appendix A.6)

- Overall, the section is straightforward and accurate.
- Examples of current scientific knowledge about water quality are appropriate and accurate.
- Examples of current scientific knowledge needs about water quality are appropriate and accurate. However, we recommend expanding examples to include high priority scientific knowledge needs related to:
 - o developing a strong knowledge of the effectiveness and limitations of non-structural BMPs aimed at source control of pollution (e.g. product management, education & outreach, business inspections, street sweeping). This text could be added to the end of the first bullet “Stormwater Management”.
- Developing a strong knowledge of the relationship between pollutant reduction and receiving water quality (e.g., fate and transport) as well as developing a stronger knowledge of the effects of pollutants on beneficial uses. This second point is somewhat covered in the second and third bullet “effects of chemical mixtures” and “effects of emerging chemical pollutants” but we suggest that this section be retitled “Effects of pollutants and pollutant mixtures”. The use of pollutants vs. chemicals includes pathogens which impact human health. Also, retitling emphasizes that even relationships between single pollutants and beneficial uses is still not well understood (e.g., copper and salmon, pathogen indicators and human health), even without adding the complexity of chemical mixtures.

Thank you again for the opportunity to comment. If you have any questions, please contact me at 206.684-8268

7 April 2010

Dear Puget Sound Partnership Science Panel,

Thank you for the opportunity to comment on the Partnership's Strategic Science Plan, January 2010 Review Draft. We like your general approach and structure for addressing science issues in Puget Sound.

Foremost, the Strategic Science Plan draft identifies six key needs (p. 17-35; identify performance management, science-policy engagement, science capacities, synthesis & communication, peer review, and education & outreach) and these are excellent. However, we also recommend adding **prioritize the most critical actions for Puget Sound Recovery** to the key needs list. Explicit wording for action could be highlighted either as an output of the Open Standards process or by adding this under the bullet: "A means to support ongoing two-way engagement between science and policy participants to continually identify and prioritize **recovery strategies and** information needs as the work proceeds."

We provide detailed comments on the Strategic Science Plan by section heading.

4.1 Science and Performance Management

We support the continued use of Open Standards to focus and prioritize recovery actions. In terms of resources, capacity and the ultimate success of your plan, it all comes back to having a clear adaptive management framework, guided by science, to set rigorous recovery goals, prioritize the most critical recovery actions and measure progress toward these goals. If this is done well, resources will be used effectively and the likelihood of success will increase. It is not clear what the process is for directing results of the Open Standards planning process into prioritizing key actions, and this would be very helpful. We have several specific comments in this section:

- A logical progression through the Open Standards framework is lost in the overview. With Open Standards, it is important to detail all of the steps in terms of what the essential outcomes are from each step to increase transparency, especially if this is for a general audience. Alternatively, the Partnership could keep the technical information but put the steps in the right order and add the missing steps to match the Open Standards process, with a reference for more information and clear term definitions. The Open Standards documentation could be improved with the addition of the Integrated Ecosystem Assessment description in the steps if possible (see below).
- Conceptual models (or situation analyses) and results chains should be differentiated as they are each used for specific and unique outcomes in Open Standards.
- Beyond being a framework for adaptive management, one of the strengths of the Open Standards process is determining the most critical higher level strategies to reach the Partnerships' stated ecosystem goals and objectives. It would be useful to consider using this application of the Open Standards and clarify how the Partnership's strategies contribute to reaching sound-wide ecosystem goals.
- Both Open Standards and the Integrated Ecosystem Assessment (IEA) have strengths, and are complimentary. We recommend clearly articulating the relationship between the two processes and integrate this into one overview to improve the overall concept and purpose. In addition, because there is overlap between what each process produces, clarifying the added value would be helpful. For example, if the IEA is adding modeling and scientific information to steps within the Open Standards, highlight where this informs the overall framework and why it is critical.

- Lastly, the text box at the end of section 4.1 (“Integrated Ecosystem Assessment provides scientific support for Partnership performance management”) should be referenced more clearly in the text. This box actually addresses some of the comments above, but it would be more useful to have all of this information outlined together, rather than in 2 sections and an additional table. And, the box highlights the missing steps in the Open Standards process that are not discussed in the Open Standards section.

4.2 Science/Policy Engagement

We agree with the content in this section, and reiterate the importance of formal, informal or ad hoc interactions with all entities engaged in protection and restoration of Puget Sound.

4.3. Science Capacity Building

We like your general approach and structure for addressing science issues in this section. We strongly agree that to be successful, the Partnership will need to integrate all existing and on-going scientific research across the region, and include social and economic factors as separate entities (where possible), rather than stressors. We encourage an explicit documentation of the strategy that will be used to ensure successful integration.

We feel that the Partnership has an opportunity to more formally integrate research and monitoring efforts as well as leverage individual projects by encouraging formal or informal meta-analysis frameworks. We encourage pulling out ‘data integration’ as one of the four cornerstone capabilities, as outlined on page 22. While effectively communicating science is a step towards integrating science across the region, and science and policy, the Partnership can go further by encouraging new studies to leverage existing or historical data in a meta-analysis framework; we feel that this is the best way to roll disparate, localized studies into a sound-wide knowledge base.

We also agree that tools to couple human and ecological trends are urgently needed for Puget Sound (page 23), and suggest that the Partnership form a working group or host technical sessions on this topic to ensure some consistency in methods across the region. The Partnership’s science program could provide leadership on this topic and establish a framework for how to integrate human and ecological systems.

4.3.1 Monitoring

Resource managers need access to fundamental datasets to understand the current status of their ecosystems and future trajectories. For example, understanding sediment, inundation and salinity dynamics in major river estuaries is essential for projecting the outcomes of restoration programs and local land use policies. And yet, few watersheds or communities have these data, or plans to obtain them. Since resource management decisions, land use policies and restoration actions needed for Puget Sound recovery will be done at the local level by local entities, the Partnership should provide guidance on local science needs for decision support. In addition, the Partnership should facilitate development of data, tools and information at the local level, and catalyze collaboration and cross-pollination among watershed and local resource management entities.

Additionally, much of the monitoring that occurs within Puget Sound exists at the project level, implemented by local project proponents. These restoration and monitoring efforts are often funded by state or federal sources. However, the resulting data have rarely been effectively utilized to advance restoration science, have not been developed with appropriate spatial and temporal scales in mind, or have not been rolled up to address broader scientific, programmatic or policy needs. The Partnership could play a key role in facilitating a collaborative approach to project monitoring by pushing the major project funders to develop and implement a common set of monitoring and data sharing guidelines. This should

include a shared understanding of critical adaptive management questions towards which monitoring funds can be targeted.

Lastly, the Open Standards process is a great tool for laying out explicit links and strategies as well as identifying data needs and the process will need expert discussion for the how/where/how much detail discussion for each indicator selected. The Partnership's science program can develop standard monitoring protocols for indicators selected during the Open Standards process, to ensure consistency of methods, and facilitate meta-analyses of indicators.

4.3.2 Modeling

To achieve recovery of Puget Sound, the decision-support needs of local resource managers and regulators should be incorporated into the Partnership's strategic plan. Much of the modeling currently in use is focused on scientific understanding rather than management decision-support. We encourage greater integration and communication among scientists, modelers and decision-makers so that modeling exercises support practical outcomes. In addition to a better understanding of how ecosystems work, we also need local scenario testing tools that allow decision makers to weigh the relative costs/benefits of alternative choices. For example, some of the ecosystem service modeling that has occurred is relevant to our general understanding of ecosystems, but is not structured to support local decision-making processes such as flood hazard reduction planning.

Models and model outputs are used by scientists, managers and decision makers throughout the region to reduce uncertainty and test alternatives. However the appropriate interpretation and use of model outputs is not always understood or communicated. The Partnership could play an important role in providing guidance for the role of different kinds of models, their inherent limits and uncertainties, and appropriate use and communication of outputs in decision making.

We support this plan's emphasis on the importance of multi-disciplinary modeling that integrates natural, economic, social and political systems. Integration among natural and social scientists doesn't come naturally so this will require a concerted and explicit effort by the Partnership to ensure that it happens. Two questions we had were: (1) How is the Partnership going to integrate modeling and monitoring since all modeling exercises need on-the-ground validation and (2) How will the Partnership move the integrated human and ecological systems research into action?

4.3.3 Data Management

The Partnership's vision of coordinating and providing access to existing data management systems makes a lot of sense, but first there needs to be an effort to develop concrete, long-lasting M.O.U.s with all of the data-producing organizations to ensure that the Partnership will be able to provide wide access, on a long-term basis, to all of these data sources. We also encourage the Partnership to develop a data management system that has access to 'living' data sources that are continually updated rather than developing a series of data 'snapshots' that only support publications and reports (e.g., State of the Sound reports and Puget Sound Science Updates). We also suggest that the Partnership develop a metadata standard for all data that will be managed in the Partnership's data management system, and require all participating organizations to follow this standard.

4.3.4 Research

Critically evaluating the need for more research or data is an important responsibility of the science program at the Partnership. The Partnership will need a strategy that balances prioritizing immediate research needs while not restricting all research to end by the year 2020. Many impacts from climate change are non-linear and won't appear before the 2020's. Nevertheless, action may be needed now to avoid catastrophic changes not projected until well beyond the 2020's. So, while conditions in the 2020's

may be the current goal of the Partnership, research and action recommendations should incorporate a much longer time scale as a frame of reference.

We think the question “What are the individual and cumulative effects of restoration and protection actions” (page 30, question 5) really gets at the heart of the matter for Puget Sound. The Puget Sound Partnership’s Action Agenda is currently an accumulation of piecemeal actions. There is an urgent need for prioritizing and initiating large-scale actions that will have the greatest cumulative effects on Puget Sound recovery and, specifically, on reducing threats to the valued ecosystem components and services identified as recovery goals. Answering this question could be some combination of working with the goals and threats identified by your Open Standards planning process and expanding on the Nearshore Partnership General Investigation to identify the most critical, large-scale actions in Puget Sound based on a cumulative effects model that considers ecosystem and social components.

On page 29, second paragraph in the section, last sentence, the plan reads “The test of the value of research is not whether it is basic or applied, rather whether it is relevant to Puget Sound ecosystem recovery needs.” We would say this even more strongly – the test is whether the research is *prioritized* by ecosystem recovery needs. To this end, we think the Partnership could engage in long-term capacity building with academia and/or the private sector to bring the Partnerships’ research priorities (current and future) into long-term research programs to provide continuity, efficiency and a role for the Partnership to direct funding towards programs that directly address the Partnership’s priorities for the next ten or more years.

Indicators that measure interim progress toward goals are very important, and we think the bolded header describes the purpose of indicators well (page 30, question 4). However, we think the discussion and determination of what is valued (ecosystem services and components, including human) should drive the development of indicators (and the requisite understanding and conceptual models of how indicators are linked to processes that are linked to ecosystem services and components), not the reverse as stated in the last sentence.

4.4 Synthesis and Key Products

Synthesis and integration using the Partnership’s documents (e.g., Puget Sound Science Update and State of the Sound) are important to keep people informed but most efforts should be spent on synthesising efforts in an on-going way, with key stakeholders and partners, to work towards achieving the 2020 goals for Puget Sound. Conferences are important venues for networking, scientific research and to support the integration between policy and science, but this should not be a priority to implement the Action Agenda.

4.5 Peer Review

The scientific community in Puget Sound is small and relatively well connected. We agree there is a need to balance the duality of objectivity and familiarity with subject matter and also recommend either a double-blind review process, or open review process where reviewer identity is released to encourage constructive criticism and transparency. Reducing bias and conflict of interest is paramount for a rigorous review process and we encourage development of written guidelines for peer review, with standards and expectations clearly defined, for example the IPCC process as suggested.

4.6 Outreach and Education

We think there needs to be a stronger link between the Partnership and local resource managers and decision makers. The recovery of Puget Sound relies heavily on local land use decisions, and while many of the restoration, resource management and monitoring activities occur at the local level, the Plan focuses mostly on state and federal agency integration. This state/federal integration that is detailed in the plan is a critical need and priority for the Partnership, but more explicit integration at the local level is also needed. For example, the data and tools developed to support Puget Sound recovery should directly

address the needs of local decision makers. This implies integration and outreach with local entities from the beginning in developing priority questions and data/tool gaps. Science working groups need to include local representation as well as agency and academic scientists to facilitate this integration

In closing, we think the Partnership could position itself as an "integration agency", promoting meta-analyses to formally integrate all of the available data into a sound-wide knowledge base that is accessible to all scientists, local resource managers, and decision makers. The Partnership's Strategic Science Plan is well placed to provide a strong framework for prioritizing actions for the restoration of Puget Sound and implement the Puget Sound Partnership's Action Agenda.

Sincerely,

Handwritten signature of Chris Davis in blue ink, with the initials 'JD' written below the name.

for Chris Davis
Director of Programs, Puget Sound

Handwritten signature of Joanna Smith in blue ink, featuring a large, stylized 'J' and 'S'.

Joanna Smith, Ph.D.
Marine Ecologist



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April 7, 2010

Dr. Timothy Quinn, Chair
Puget Sound Partnership Science Panel
PO Box 40900
Olympia, WA 98504

Dear Dr. Quinn:

Thank you for the opportunity to provide Washington Sea Grant comments on the Puget Sound Partnership's framework for developing and coordinating science activities in Puget Sound. The Strategic Science Plan is a thoughtful, thorough and well-written document that integrates ecological, social, economic, and institutional perspectives and recognizes their interdependence. The plan acknowledges the fragmentation that has occurred in the past and stresses the importance of coordinating future research efforts across state, federal and local agencies, tribes, universities, non-governmental organizations, and volunteer groups. It also recognizes that current data management is insufficient and that investment is required to support a centralized system and improved data access. Shared priorities with Washington Sea Grant include a focus on the potentially significant contribution of citizen science to science activities in Puget Sound and the central importance of translating research for use in decision-making and engaging the public.

Based at the University of Washington, Washington Sea Grant has worked for more than 40 years to develop and provide technical data, assistance and outreach to support sustainable use and enjoyment of Washington's oceans and coasts. Washington Sea Grant operates a rigorous selection process for science projects on a biennial basis and invests more than \$1 million per year in applied and policy-relevant research to address Puget Sound scientific needs. The Strategic Science Plan provides a valuable blueprint for identifying research priorities to which Sea Grant-supported projects can be aligned. Toward the goal of maximizing available research dollars, we recognize that research efforts in Puget Sound are supported by a range of funding sources and would like to work with the Science Panel to identify potential mechanisms for improving coordination in setting priorities and making research funding decisions. Given Washington Sea Grant's experience and continuing need to administer competitive and peer-reviewed requests for proposals, we would also be very interested in discussing the development of a collaborative and rigorous proposal review and selection process.

As many of the Science Panel members are aware, Washington Sea Grant is committed to supporting and enhancing citizen science efforts in Puget Sound that contribute to research, management, and monitoring needs. We share the Panel's view that rigorous citizen

science has the potential to cost-effectively contribute valuable data and monitoring necessary to protect and restore Puget Sound. Citizen science—defined as projects and programs involving the public in making observations, and collecting and recording data—engages the public in efforts to protect and restore natural resources, enhances public stewardship, and increases the availability of credible, lower-cost data in Puget Sound. We are currently working to make connections between science and monitoring needs and appropriate citizen science and volunteer programs. In addition, we are working to support and strengthen existing and new programs by providing programs, scientists, and managers with information and assistance on best practices for successful and rigorous citizen science projects. We look forward to working with the Puget Sound Partnership and the Science Panel to foster citizen science networks in Puget Sound.

Finally, education, outreach, and communication are central to the mission of Washington Sea Grant and the Strategic Science Plan is right on target in including these essential components to support protection and recovery of Puget Sound. Over the years, Washington Sea Grant has made a substantial investment in building its outreach and communications capacity and currently maintains a staff of more than two dozen experts. We would like to work with the Partnership and the Panel in strengthening and implementing plan goals in this area. In addition, while the plan provides clear definitions of education and outreach, it does not specifically acknowledge the importance of technical assistance to Puget Sound residents and decision makers. We recommend that it be included in the list of outreach and education efforts (page 35).

Thank you for the enormous effort and thought that has gone into the document to date and for your consideration of the comments from Washington Sea Grant.

Sincerely,

A handwritten signature in black ink that reads "Penelope Dalton". The script is fluid and cursive, with the first letters of "Penelope" and "Dalton" being capitalized and prominent.

Penelope D. Dalton
Director

Dt: April 7, 2010

To: Puget Sound Partnership

Fr: Josh Baldi, Special Assistant to the Director, Washington Department of Ecology

Re: **Ecology Comments on the Strategic Science Plan, January 2010 Draft**

Following are the Washington Department of Ecology's (Ecology) comments on the Puget Sound Partnership's (PSP) Strategic Science Plan, *January 2010 Review Draft*. We offer "overview comments" that speak to themes in the draft plan, followed by detailed comments that were compiled from several reviewers at Ecology, primarily our Environmental Assessment Program.

Detailed questions about Ecology's comments can be directed to Rob Duff, Ecology's EAP manager. Thank you for this opportunity to comment on the Strategic Science Plan.

Sincerely,

Josh Baldi

Overview Comments

1) Place Priority on Applied Science to Inform Management Actions

Several sections of the draft plan describe the importance of "two-way engagement between science and policy participants to continually identify and prioritize information needs as the work proceeds". More pointedly, the purpose of the plan is found on page 7:

"The purpose of this *Strategic Science Plan*, authored by the Science Panel, is to provide the overall framework for development and coordination of the science activities needed to support protection and restoration of Puget Sound under the *Action Agenda*."

Ecology understands the critical interface between policy and science and fully supports the Plan's statement of purpose. Yet, the Plan does not sufficiently recognize the need to engage regulatory agencies and other government agencies on implementation. At one point the document states that the research community will guide monitoring and modeling, but there is no recognition that often regulatory needs require alternative approaches to those proposed by other researchers. Links to regulatory actions or other implementation strategies must be added to the section on enhancing capacity in the region, since simply "knowing the answer" is insufficient for achieving results on the ground.

2) Emphasize Strategic Applied Research

The Puget Sound science community struggles with the term "research," and this struggle is reflected in the document. The document includes the terms "applied" and "basic" but argues that "basic" science is really "strategic" science. This could leave the impression that the document advocates specifically for

university-based research. This could be misleading on two fronts because: 1) Both fields of study can be employed strategically; and, 2) both fields can be performed by both agencies and universities. These points should be made clear in the Plan. If PSP intends to support both basic and applied research, one novel role for the Science Panel would be to focus on the intersection of “basic” and “applied” science.

While Ecology sees the value of both basic and applied science, we believe the emphasis should be placed on applied research. A case can be made for PSP to invest *exclusively* in applied science given the statutorily mandated 2020 recovery goal. Practically speaking, a premium needs to be placed on existing, under-utilized management authorities given that PSP has less than a decade to achieve recovery. A persistent theme of the past four years has been: “enforce the laws we have.” Having more of the region’s science capacity to support the existing management authorities would strengthen the political resolve to implement them.

3) Articulate Long-Term Science Strategy

The document describes the strategy for developing short-term (biennial) science plans but does not identify specific plan elements. This distinction should be made in the introduction. Sections 1 and 2 do a good job of describing the larger setting as well as how this document complements the future biennial science work plan. However, missing from this document or any of the related documents is a longer-term science strategy or when it will be developed. Simply updating biennial science work plans in the future may not recognize the long-term science needs of the region. There is also the risk that biennial requests for proposals and competitive awards likely undervalue long-term monitoring programs. These programs are most valuable when placed in the context of decadal changes to the ecosystem. This disadvantage should be considered when developing criteria for funding.

4) The Importance of Information Management

We appreciate that the document includes data management as a pillar of the science strategy for Puget Sound. However, there is very little mention of how our collective regional knowledge will be maintained and exchanged amongst the myriad entities in the long-term. Science Updates could become the important science yearbooks, but these likely will capture only high-level information. Also, the term Data Management should be broadened to Information Management.

5) Effective Communication

Communication is mentioned specifically and alluded to in several places, but the Science Panel should consider adding it as a fifth cornerstone. Simply moving it under “Data Management” does not really capture the purpose of communication. Also, the document emphasizes communication from Partnership-derived groups outward and collaboration via work groups, but there is little in the strategy to capture the high-level results of funded projects. One option is to advocate that funded projects produce brief summaries identifying major findings and providing references to documents with more details.

6) Clarify Role of Modeling, IEA and Open Standards

We support modeling as a recognized pillar of long-term management in Puget Sound. However, much of the modeling discussion centers on the Integrated Ecosystem Assessment (IEA) approach. While conceptually IEA makes sense, the term causes confusion in the regional scientific community and needs clarification. For example, NOAA is managing an IEA project that includes modeling, but other agencies are applying computer models as well under projects that do not include risk assessment. Since risk assessment is listed as the second element of IEA, does that mean that these other projects are not conducting IEAs? In that case, does this strategy document intend that those are not acceptable projects for long-term Puget Sound management? We would disagree.

Another term causing confusion in the scientific community is Open Standards. While we support this conceptually, our familiarity is more in the performance measure tracking realm. State agency managers may be more comfortable with it, but its use in a scientific strategy document seems like a non sequitur without further context.

7) Peer Review

Peer review represents an essential component of a resilient science program. The document recognizes that no one-size-fits-all peer review process exists. Also, NSF and journals have struggled with fair and adequate peer review for years, and even those processes are not immune to misuse. As a start, funded projects should propose a peer review plan that builds on existing institutional programs.

8) Don't Forget Our Neighbors

While the larger Salish Sea and Canada are mentioned briefly, the document does not include any elements of a strategy for engaging the Canadians and collaborating on international issues. The Science Panel and other Partnership-derived groups should develop a strategy for working on trans-boundary issues.

Specific Comments

Scott Collyard

There is a lack of emphases/importance on how this strategy will result in on the ground implementation actions.

Bob Cusimano

1. I'm uncertain how it will be used or translated into "on-the-ground" projects and monitoring.
2. The goal of the plan is to provide an overall framework for developing and coordinating science to support Puget Sound ecosystem protection and restoration. The document discusses the need for Ecosystem Based Management, but doesn't discuss the important ecosystem services we are trying to protect. I don't think it is obvious to scientist or managers what are important "ecosystem services." I think the science plan should be somewhat tailored to what specific science we need to protect and restore specific ecosystem services vs "everything."

For example, The Governor's Comprehensive Monitoring Strategy and Action Plan for Watershed Health and Salmon Recovery describes very specific science needs to recover and protect salmon including management questions that need to be addressed. PSP's draft strategic science plan is more focused on research than protection and recovery of ecosystem services. (See [The Washington Comprehensive Monitoring Strategy and Action Plan for Watershed Health and Salmon Recovery, www.test2.rco.wa.gov/documents/monitoring/Executive_Report_final.pdf](http://www.test2.rco.wa.gov/documents/monitoring/Executive_Report_final.pdf))

3. The document is very general about what science is needed to feed the adaptive management cycle. In appendix A, A.1 and A.5 align well with regulatory and management needs (A.5 is good), but the other topics in the appendix are more focused on research and problem identification. We need more science and engineering information to support management decisions related to how we can "fix" problems rather than identifying them. For example, we need information about how we can improve our urban hydrographs (improve specific flow metrics) and improve watershed health not research showing how urban hydrographs impact watershed health, i.e., we already know that.
4. Science capacity building needs to link to regulatory responsibilities more and not just ecosystem problem identification and process understanding. Again, the discussion in A.5 does a good job of linking real management decisions and needs with the science required.
5. Should consider adding "Information Presentation and Communication" as a 5th Cornerstone Capability. The reports required in legislation are somewhat out-of-date with respect to communicating science and other information and outreach.
6. Competitive awards for funding short term top priority investigations will probably work okay, but it doesn't work for long-term needs. Science capacity (including modeling ability) needs to be supported for the long term. Policy and management decisions need continual input from skilled scientist/engineers and can't rely only on short term purchase of expertise, especially from groups that are not familiar with the policy or management needs. Most major environmental decisions take years to make such that the supporting science must "travel" along with the policy and

management discussions (i.e., can't be just contained in one time reports). I don't think the "competitive award" structure will work unless it is just used to support more permanent science/engineering capacity that is built into the overall system. This could be existing organizations, but the capacity can't be built with short term competitive awards.

7. Although I agree with the discussion about long term support of modeling for "forecasting" on P26, there is also a need for models that directly support the adaptive management decision process that rely on the "best-technology and information available." Models need to be used to support management decisions within some reasonable time (i.e., modeling tools need to be used to help make decisions "now"). In addition, modeling tools that support regulatory decisions need to be more tailored to specific questions than "ecosystems" in order to make management decisions. The modeling discussion in general is too focused on "ecosystem" forecasting ideas, while adaptive management requires data driven calibrated models that provide specific information about specific issues.
8. Section 4.3.4. Research: Seems like this section is different than the rest of the document. I don't think the document needs to promote research. The other sections don't explore or give examples of why we need monitoring or better modeling tools at this level. Research should be treated the same as the other components discussed in the document.
9. Section 4.4 Synthesis and Key Products: Again, I think there should be a 5th science capacity to build information/communication/presentation. The required reports are okay, but we need better science communication tools.
10. We are now talking about the Salish Sea vs Puget Sound yet the Strategic Science Plan doesn't mention anything about coordinating science with Canadian scientist working in our shared waters.

Rob Duff

Pg 11, 4th Par, 4th Sent – delete "an"

Pg 12, 2nd Par, 2nd Sent – add comma after "general"

Pg 12, 3rd Par, 3rd Sent: "Interspersed among the forests, particularly at lower elevations, are other notable ecosystems such as prairie, madrone forest, oak woodland, and wetland and bog communities."

Pg 12, Second to last Par, 1st Sent: "The human population of Puget Sound reflects significant ethnic and racial diversity, including a rich Native American heritage with numerous tribes currently living? located? throughout the region."

Pg15, Section 3.2 –

Comment: Applaud the effort to note the implications of uncertainty in decision making here. I would be more frank. The science strategy will *not* provide "yes/no" answers for policy makers. Uncertainty can't be reduced to zero but is always addressed as part of good scientific method and assessment.

Pg 15, Last bullet: "adjust the actions ~~by~~ after comparing the measured outcomes to the predicted outcomes "

Pg 24, Last Par, 1st and 2nd Sent: "working with the Partnership's Monitoring Program Manager and staff. It is envisioned that implementation of the monitoring capability will involve ~~work of a monitoring~~ steering committee and ~~working~~-topic specific work groups ~~as needed~~."

Pg 27, 2nd bullet: “Current modeling activities are widely diverse including climate, ecosystem, watershed restoration, salmon recovery, hydrological, contaminant transport, landscape, and human valuation. This necessary but diverse modeling must be better coordinated and linked to Partnership needs. ~~Needed is better coordination within and among these components of ecosystem modeling and linking these groups with what the needs of the Partnership are, via RFPs.~~”

Pg 29, Last Bullet - reads”Require a capability to make indicator data and other assessment information available and accessible to a diverse user community consisting of managers, researchers, stakeholders, and the general public.”

Comment: Ecology supports this concept and is already moving towards it. We suggest a distinction between what data needs to be “communicated” as opposed to “accessible and available”. Communication of key data that supports high-level indicators goes beyond simple accessibility and should be a high-priority. Reporting high-level indicator data via a single platform across agencies might be a worthy goal. Other, perhaps more detailed data, should still be accessible but does not necessarily need the same level of manipulation....that is, make it easily accessible through a portal but don’t consider all data as a communication tool.

Pg 32, 2nd to last Par – delete colon at end of sentence

Maggie Dutch

P 2, first full paragraph – In conclusion, the Science Panel recommends a strategic science program that includes...

Comment: The words “strategic science program” is capitalized in some places (table on p.8) and lower case in others (p. 6,9,15,17). I was confused as to why they did this. Be consistent with cap or lower case, and clearly define what this program is if you capitalize it.

P 5, section 1.2, paragraph 2 – “...Puget Sound is a national treasure and the life-blood of Washington State...”

Comment: Folks from eastern WA might not agree to the “life-blood” comment...I think that they think Puget Sound is more of a western WA thing...

P 5, section 1.2, paragraph 2 – “...current activities to protect and restore the PS ecosystem are fragmented, uncoordinated, and mostly ineffective at the ecosystem scale...”

Comment: add the “the”, above. Also, there should a qualifier in this sentence to indicate that many efforts have been well done, and have given us the large body of knowledge to determine what the problems in PS are, and what more should be done. They should acknowledge that these activities have been underfunded in the past, and that is why they have been fragmented, uncoordinated, and mostly ineffective at the ecosystem scale...They need to acknowledge in a positive way the good work that has been done in the past in spite of a political climate that did not support this work, and that, with adequate commitment and funding, the missing connections can be made...This is sort of addressed on p15, first paragraph, but should be underscored earlier in the document as well.

P 17, section 4 – general comments

Comment:

P 24, Section 4.3.1 - Covers relevant points regarding monitoring, but never actually names the new “Coordinated and Integrated Monitoring and Assessment Program” in the document. It would give the

new program more credibility if it was actually named.

Section 4.4 Synthesis and Key Products – this section focuses on the PSS Update and the SoS reports, products of the PSP. They should also give some guidance as to what structure they would like to see data reports formatted in by state and local agencies, tribes, others. Should they follow strict scientific format to adequately document the science, or should they be in a more “general reader” format, with lots of slick graphic arts, or both? This info should be tied into both this section as well as the peer-review section.

Overall

I think the authors did an excellent job on this document and covered all relevant points. They should, however, stress somewhere in the document that a LONG-TERM COMMITMENT to adequate funding is ESSENTIAL for all of this to happen. It will fail without it and/or if the political winds shift.

Dave Hallock

The document should give sediment a more direct nod in Section A.6 rather than lumping it in with "and other dissolved and suspended constituent concentrations and effects."

Christopher Krembs

Comments about the format of the document:

- Chapters not well connected
- Many chapters are insufficiently organized.
- Redundant information and text passage make it cumbersome to read
- Document can be shortened by at least 1/3
- The relevance of information in the text is not weighted appropriately from chapter to chapter (e.g. chapter 2 to detailed)
- Large changes in writing style need to be addressed.
- Some chapters write too much around general ideas without coming to the important points right away
- Better definition of terms and a more consistent use (e.g. recovery). What is e.g. “ecosystem strategic science program” really?
- Important text passages that should stand out are not emphasized e.g. Goals of the PSP Science Panel e.g. p6 3rd pg. , pg 7 2nd sentence

Specific comments:

- The chorus in the document is to increase our knowledge of PS processes etc... I see the effectiveness and use of the collected knowledge a more important goal to emphasize. Performance measures for scientists could be e.g. "How often is your information being used for PS recovery"?
- Overall, I see a key problem with the skewed presentation of science in the document. Science is portrayed as the ultimate solution to implement accountability and objectivity in the recovery effort of Puget Sound. The challenges and shortcomings of the scientific process and grant proposal system are not addressed. (E.g. challenges to maintain long-term monitoring efforts, over statement

of problems to obtain funding for money strapped scientists, biased or unqualified reviews and reviewers, shortcoming of the volunteer based reviewing process, conflict of interests, lack of monitoring progress and relevance to PS recovery for individual projects etc.). Who and when is there a process that is evaluating if project actually make a difference in recovering PS?

- The goals of the Science Panel (p.6, 3rd p.g.) are very important and need to be defined very clearly.

I have in particular a problem with point 3). ...”develop and provide oversight of a competitive peer-reviewed process for soliciting, strategically prioritizing, and funding research and modeling project”... Peer review of proposals is a very complex system. NSF has science panels; project managers etc. and yet face major challenges with e.g. reviewer fatigue, failing to deliver progress reports etc. How will the process of "objective peer review" and project accountability be realistically implemented by the Science Panel?

What is the process of “strategically prioritizing”? Who is sitting down and is actually deciding this point for each proposal? Who is accountable that the selection of projects is in the larger interest of ecosystem recovery and not basic science? Who or what entities are evaluating any cost benefit questions of the projects in relation to PS recovery.

Dale Norton

Page 21- The Toxics Loading steering committee is identified as guiding development of a source control strategy. This seems to be a new role for that group. I do not think the current representation of the group (primarily state and federal government agencies with some county) is the right mix to develop an overall source control strategy. I would recommend that if this group is to guide development of a strategy it needs a broad representation base (i.e. business, environmental advocate groups etc.)

Page 28- Did they want to include a statement that addresses development of data management systems that are capable of handling a broad range (including emerging) of monitoring data (i.e. continuous data)

Page 35- Seems like one of the challenges is making information on Puget Sound readily available to the public in a format easily digested. This could include something like the air quality index (Puget Sound Health Index?) in the weather section of the newspaper or a web based application similar to “Eye on Earth”. Seems like they could include a line item that more specifically calls out targeting development of these types of communication tools.

Patricia Olson

Introduction

Pp 3: Section 1.1, 2nd paragraph, last sentence “Natural and human induced stresses decrease the capacity of coastal ecosystem such as Puget Sound to provide highly valued goods and services” needs clarification because under natural disturbance conditions the species that are now of concern, threatened or endangered had adapted to natural disturbance regimes and stressors. The point maybe that now that there are additional human induced stressors and also increased natural disturbance frequencies due to human actions and climate change, that species can no longer adapt quickly enough

to maintain populations and functions are impaired and cannot “manage” the natural disturbances (e.g. increased frequency of higher magnitude floods, increase sediment as glaciers recede, etc).

Science and policy take time. Is it realistic to assume that the Puget Sound will be healthy by 2020 given all the unknown responses, trajectories and interactions? It’s an admirable goal but the document should temper it by all the uncertainty.

Section 4.3: Science capacity building

The four cornerstone capabilities appear to be treated as separate elements rather than actions on a continuum which detracts from the message. Perhaps I am an old-fashioned scientist but I thought that research usually came before monitoring unless the monitoring is based on previous research. Also that research can include such aspects as monitoring, modeling, and information and data management. The way the strategy is written it implies that all these elements are separate and not congruent. Also it implies that monitoring and modeling are done first to identify gaps (e.g., pp 22 bullets under section 4.3, matrix on pp 23, pp 24, pp 29) not research. Research can be as simple as evaluating what is known from previous studies, what questions are not addressed, what questions are important to address, what indicators can be developed from previous research. Research can also include data mining to develop monitoring indicators and conceptual (results chains) or quantitative models. Or it can be rather complex with multiple hypotheses and methods. While it is understandable that the authors wanted to emphasize each “cornerstone”, the manner is somewhat confusing as to importance and interaction among elements.

In the first paragraph, effective communications is listed as part of a sound science program but it should be given equal weight as the listed cornerstones. Given that this is a science strategy, I don’t expect that the social and political issues would be addressed adequately. But science is only useful for providing information to change behavior if that information can be communicated in a manner that provides incentives for behavior to change. For example, we understand impacts of increasing traffic on air quality and links to health problems such as asthma, as well as stresses on existing infrastructure and limited transportation budgets but that information by itself apparently hasn’t changed the majority desire to drive in a single occupancy vehicle. More emphasis is needed on communication and incentives.

The document emphasizes the Open Standards results chains (which are very similar to the 1990’s causal statement flow diagrams) and the IEA framework (again a compendium of methods promoted during the 1990’s) as the preferred modeling tools. Yet it provides no examples to illustrate their value over other tools. Also on pp 19: the document lists the elements of the IEA framework but it is missing what may be one of the more important steps—scoping, outlined in the reference identified in the document (e.g. Levin et al 2009). Levin et al (2009) list it as the first step and provide case studies showing its value. Scoping is a tool that can be very valuable for integrating science, policy and communities. The scientific community can use the tool to identify research priorities, gaps, etc also. For example, in the Shoreline Master Program Handbook (Chapter 7), we emphasize the importance of scoping before going out and collecting information that may not even be relevant to the community and its shoreline ecosystem. The strategy should include this step in further discussions.

As Mindy pointed out risk assessment has a very specific meaning to other groups that is different from the IEA. For example flood risk is defined by flood probabilities and loss. Many ecosystem functions do not have probabilities associated with them unless you get into Bayesian probabilities which I doubt they are thinking of doing. Anyway, I agree that decisions should not be postponed because risk is uncertain.

The data management should also include information as part of the management. On pp 29, five tasks are listed. Nowhere does it address evaluating the data quality. Data is not particularly useful for science if the data limitations, errors, measurement methods etc, are not known.

On pp 29 there is a discussion on how to categorize research. Perhaps some lump research as “basic” or “applied” but it is more informative to say theoretical, empirical, experimental, applied or a hybrid of the above research. Giving it new names such as tactical or strategic doesn’t really help to clarify what kind of research is purposed, sampling strategy etc. The last sentence in the paragraph gets to the point, it doesn’t matter what kind of research is done as long as it is relevant.

Pp 30: The science questions are very high level and thus are not particularly tractable. Perhaps providing examples of specific, tractable questions under each question would provide a better understanding of the context.

Pp 31: The Partnership and its Science Panel propose to build research capacity by identifying and ranking research priorities for funding and reviewing proposals. As the authors point out in the Introduction Puget Sound functions and well-being is contingent on the interaction between the marine ecosystem and the freshwater ecosystems. Yet the PSP staff and the Science Panel are heavy on marine expertise (science and policy) with very few freshwater ecologists, earth scientists (e.g. hydrology, geomorphology, geology) or policy analysis. There is much language about collaboration with other groups, agencies, tribes etc but has the PSP done much of this in the freshwater portion of the Puget Sound. Perhaps indirectly through some of the Salmon Recovery plans but there is more to freshwater ecosystems than salmon. Will the research priorities be encompassing of the whole system or mostly the marine ecosystem? Examples are given in the appendix. The examples illustrate this imbalance with more precise (and tractable) descriptions or examples given concerning marine issues when compared with the examples given for freshwater or upland ecosystems expertise. Plus as others have noted, the Puget Sound is international but there is no mention of collaborating with Canada.

Mindy Roberts

Sections 1 and 2 provide good overviews of how this document fits into a larger context and the physical system. Section 3 mentions uncertainty and adaptive management—very helpful. Would be helpful to point out in Section 3.2 that the science already shows that what we have been doing is not working, and something else is needed both to manage our historical and current impacts as well as to avoid or mitigate our future impacts. While there may be uncertainty in what we do, we are certain that business as usual will not work.

Section 4.1 describes open standards and performance management, but scientists need more information to understand what performance management means to them. This language is more familiar to agency managers who need to report on performance management. The section also describes IEA. This is still confusing for much of the scientific community, partly because NOAA is managing projects called IEA. The discussion needs to be broadened to describe how other projects not called IEA are still part of an IEA framework. Page 19, step 2, stipulates that a risk assessment should be conducted. However, this has a very specific meaning to toxicologists and other risk assessors. While some actions may require a risk assessment, decisions should not necessarily be halted until a risk assessment has been performed.

Section 4.2 describes science/policy engagement, but it’s not clear whether the work groups discussed are plugged into particular policy and decision frameworks. There is no mention of potential regulatory

frameworks for implementing management decisions. While this document should not go into detail, it should mention that engaging regulators and implementers are key steps.

Section 4.3 argues for the need to expand science capacity. In a general sense, no one would argue against this. However, there seems to be an underlying emphasis on academic science rather than agency science. For example, research is called out separate from monitoring and modeling, even though research can and should include both monitoring and modeling. Section 4.3.1 states that “[t]he research community will help identify where changes need to be made to monitoring...” but that’s only one group to advise on monitoring designs. Who does the Science Panel see as the “research community?” If this includes scientists within agencies, then no problem. However, if it’s intended to be the academic research community, then it’s not a good statement. Page 25 lists both agency and academic scientists, and both would be needed.

Section 4.3.2 is a good argument for including modeling in our long-term strategies. On page 27, the first bullet describes conceptual models, and that’s a good idea to start with. The second bullet mentions the Puget Sound Marine Environmental Modeling group, but this group no longer exists. I suggest rewording that sentence as: “Peer networks of modelers and project-specific advisory committees have convened in the past to coordinate and exchange information.” The third bullet argues specifically for IEA; if this could be generalized, that would minimize confusion by those who could interpret this as “NOAA’s efforts will advise us.”

The emphases on data management and adding people to the system are excellent—I would suggest generalizing this to information management and emphasizing building our long-term collective institutional knowledge.

Section 4.3.3 provides a good description of research in general, including the applied and basic distinction. The section argues more for applied and strategic research, which is the appropriate use of Puget Sound-specific funds.

Section 4.4 gives a good description of the various science products. In addition, the Science Panel and Partnership should advocate for brief synopses of projects funded through Puget Sound-specific channels. These 2-page high-level summaries should target the general Puget Sound community and should include links to more detailed project documents. Over time, this will build a library of research, monitoring, and modeling results that will be of benefit to managers in 2020 checking to see if goals were achieved. These brief documents would also benefit education and outreach, described in Section 4.6.

Section 4.5 is a great discussion of peer review. The Science Panel and Partnership should advocate for the development of a peer review plan for any project funded through Puget Sound-specific channels. The funded entity can propose a peer review plan as part of the overall project plan to ensure quality of the results, subject to review by those advising the projects. Section 4.5 gives a good description of alternatives for peer review.

Education and outreach in Section 4.6 doesn’t mention reaching decisionmakers and policy makers. The section doesn’t really say what the Science Panel or Partnership will do, however; just the process to develop education and outreach.

The appendix doesn't really mesh with the rest of the document. I appreciate that this documents the strategy for laying out a science program and is not the science program itself. Sounds like the Science Work Plan will do that, at least for the next two years. The appendix does state that these are examples and are not meant to be comprehensive. Nearly all of the examples represent university-driven science. These are all very useful programs, but it doesn't represent a true random sample. Instead, I suggest deferring this section to the Biennial Science Work Plan.

Brandon Sackmann

The goals of the PSP are noble and generally resonate with my own feelings in terms of what "should/could be done" to protect and restore Puget Sound. That said, the PSP is hobbled in the sense that they were given no mechanism by which to entice (or even force) participation by key players. The underlying premise is that we are all going to start rowing the proverbial canoe in the same direction because the PSP "asks" us to...scientists (and arguably the public) have been trained to be skeptical; I think it will difficult to get everyone on board.

READING FROM THE PERSPECTIVE OF ACADEMIA -- One way to read this document is that the PSP feels entitled/obligated to control all the science that gets done in Puget Sound – or at the very least ensure that all science supports their vision of the overall recovery effort. With respect to academic institutions, it seems like this is likely to garner one of two reactions; 1) academic participants will view the additional overhead associated with working under the PSP umbrella as unnecessary and simply change the location their study region (many groups are process oriented and are not tied to any particular geography), or 2) individual researchers will "re-cast" the goals and motivations for their existing research (some of which may truly be applicable and some may not) so that they better align with PSP objectives. In either case, no new science gets done in Puget Sound! I think it will be a very small percentage of academics who will go out of their way to change their research objectives just so they can work in Puget Sound with the PSP. I really believe that the only way to ensure participation by the academic community is through additional funding opportunities...but with so much of the existing funding coming from federal sources I do not see how this is feasible until a new pot of money is identified that the PSP can control exclusively.

READING FROM THE PERSPECTIVE OF DEPT. OF ECOLOGY - - As a co-state agency I can see where it is in our best interest to cooperate with the PSP, so perhaps they are able to exercise a bit more leverage with Ecology and other Natural Resource Agencies. Even so, I would have liked to see more discussion on how management decisions from the PSP would ultimately be implemented. I think the Science Plan does a decent job laying out how one might monitor the system and understand the driving forces (including some specific strategies)...so they are well poised to watch the system evolve and ultimately understanding why...but I fail to understand how they hope to do anything that could actually alter the trajectory of the system (flow charts and graphics showing adaptive management feedback loops are insufficient!). It would have been nice to see how they intend to use the existing natural resources agencies within the state to actually begin making changes. In my view, any management decisions that percolates up through the PSP still have to be aligned with the goals/mandates/directives of the other state agencies so that they can "do" something. Again, since the PSP has no mechanism to implement any sort of large-scale management activity on their own they will have to work through/with existing local, state, and federal institutions. Perhaps this is outside the scope of the "Science Plan", but I have not yet got a sense of their strategy in this regard.

Perhaps my largest problem with Science Plan relates to Section 4.3 Science Capacity Building. Clearly the Science Panel acknowledges the need for additional science capacity (as stated in the first paragraph of pg 24), but I would argue that the specific tasks outlined to build capacity do not necessarily “build” anything – “reorganize”, maybe; but not “build”. Most of the tasks centered around improved coordination of activities, the formation of working groups, ensuring that new/existing tools and information serve multiple purposes, etc.. In essence they are suggesting that we try to do more with what we already have and try to be smart about what we do in the future (arguably goals shared by many/all of the key participants in this effort), so while I might agree that these are things that we should try to do I fail to see how this builds any sort of additional capacity to do science in Puget Sound.

I also struggled with the language in Section 4.3.4 related to the distinction between “basic”/“applied” vs. “tactical”/“strategic” science. No matter what language is used to describe the science that gets done I still see an enormous chasm between basic (i.e., academic) and applied science. I would argue that a key place to build additional science capacity is at the interface between these two “flavors” of science. The transition from “research” tools/products to “operational” tools/products is painfully slow. I think that if the PSP could focus their efforts at this interface they might be more effective. Essentially they could let the basic researchers continue to do what they are doing (smaller scale projects/riskier endeavors/larger potential payoffs when successful); let the natural resource agencies continue to do what they do (larger scale projects using “proven” technologies) – and focus the efforts of the Partnership at bridging the gap to allow new tools and technologies to percolate up more quickly. If science is like cooking, then the “basic” research generates the ingredients, the “applied” research cooks from the written recipes – but we need more cooks in the middle creating new recipes!

My final nitpicky comment relates to international collaboration. The word “Canada” is only mentioned once in the document (figure caption top of pg 4); Salish Sea gets a couple of additional mentions throughout the document. If the PSP truly does see this as an international problem/effort then I would have liked to see more specifics on how they propose to improve the coordination of activities with our Canadian counterparts.



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TO: Puget Sound Partnership, actionagenda@psp.wa.gov
FROM: Common Sense Alliance
DATE: April 7, 2010
Re: PSP Strategic Science Plan (January 2010 Review Draft)

The Common Sense Alliance (“CSA”) is a non-partisan nonprofit organization whose mission is to provide legal, scientific and economic information to the public and local government of San Juan County, Washington, regarding land use issues under the Washington Growth Management Act, San Juan County Critical Areas Ordinance, the Washington Shoreline Management Act and San Juan County Shoreline Master Program. CSA promotes public participation in the “bottom-up” planning effort required for local land use planning and decision making by informing the citizenry regarding evolving issues and providing information required for sound decision making and good public policy. We work to support the development of environmental protection policies and land use regulation consistent with reasonable interpretations of the Growth Management Act and Shoreline Management Act. It is our goal to be part of the solution regarding issues involving land use, development and the protection of the environment in the San Juan Islands.

We agree with and/or support many of the propositions stated in the Puget Sound Partnership Strategic Science Plan (“PSPSSP”), but continue to have serious concerns about several aspects of the PSPSSP and/or the attitudes it reflects. We address these in separate sections below.

Points We Agree About

1. That “we must better understand the human dimensions of restoration efforts that consider human health, economic well-being, and social norms and values.”
PSPSSP at 1. We are pleased that the PSP has acknowledged that:

Our collective knowledge of Puget Sound comes from decades of investigations and observations conducted for diverse reasons by a wide variety of dedicated people and organizations. However, much of the existing knowledge about the Puget Sound ecosystem comes from studies with limited scope, which has often resulted in a somewhat fragmented and non-uniform understanding of the Puget Sound within the broader Georgia Basin - Puget Sound (Salish Sea) ecosystem.

PSPSSP at 1, see also PSPSSP at 15, 27. We also agree that the Puget Sound and Salish Sea include unique geologic and environmental conditions making reliance on studies and observations regarding other areas of the world and any one-size-fits-all approach suspect. See PSPSSP at 10, 12.

2. That “communications issued by the Partnership be reviewed for technical accuracy, consistency, and disseminated throughout the organization and participating groups.” PSPSSP at 21. We further agree that “there may be differences of opinions and interpretations of the meaning of data and information from the ecosystem,” and that “the underlying data and facts should be freely available, subject to scientific review, and that open and frank discussions will lead to workable solutions and testable hypothesis.” Id. We are concerned about the effect of “informal and ad hoc interactions” because these types of communications can undermine public confidence in the fairness and objectivity of the process.
3. That the PSP should recognize the need to include people in its analysis as something other than a problem. PSPSSP at 23. Although it seems strange to us that this appears to have come as something of an afterthought, we are pleased that the PSP will now consider the effect of its actions and recommendations on the people who live here.
4. That research is needed on the topics identified in section 4.3 of the PSPSSP, and generally those topics included in the Appendix, but we must stress the need to focus on identifying the problem(s) before looking for potential answers, particularly when further land use regulation is part of the Agenda.
5. That peer reviewed findings and conclusions are essential to inform policy making. Furthermore, we agree that “To prevent real or perceived conflict of interest, reviewers [should] be limited to individuals dissociated from the activity or product being reviewed.” PSPSSP at 33. We are curious, however, about how PSPSSP plans to accomplish this while securing appropriate expertise for the reviews. This is critical to the public perception, as well as the actual scientific integrity of the process.
6. That we must ask the right questions like “How much is enough?” or how many of a particular species do we need and how much habitat do we need to support the needed numbers. Whether, and if so, “how upland development will affect recovery efforts [for salmon].” PSPSSP at 42. These are critical questions that must be answered **before** we impose additional restrictions on land use in the name of fish and wildlife habitat conservation.

Issues We Have Concerns About

1. The PSPSSP is rife with Orwellian gobbledygook and double speak making it very difficult to understand and rationally comment upon certain sections. For example, the notion of “communication between science and policy” and the personification of each does nothing but obscure the necessary lines of communication among people -- between policymakers, scientists AND the parties that will be affected by the resulting policies and actions.
2. We believe that the PSPSSP still contains evidence of significant bias favoring environmentalist assumptions notwithstanding its recognition that much is simply not known and has not been adequately studied or peer reviewed. Moreover, seeking to develop science capacity “to support the Partnership’s Action Agenda,” PSPSSP at 23, rather than to objectively evaluate and validate and monitor all of the effects, environmental and social, of proposed approaches.
3. The PSP emphasis on so-called adaptive management approaches should not be viewed by the PSP and regulatory agencies as a license to keep changing the rules whenever the wind changes. Constantly changing the rules affecting land use is fundamentally unfair to property owners and undermines public confidence in government and due process.
4. The PSP appears to be trying to gain control over local decision making regarding land use without first addressing the first step that it recognizes is necessary to advance its objectives. As the draft concludes: “For protection and restoration strategies to work, the fragmented approach to managing resources across diverse geographies and governmental jurisdictions must give way to collaborative **problem identification**, ranking, and solving.” PSPSSP at 5 (emphasis added). We believe that specific problem identification is absolutely necessary as a matter of fairness and common sense before meddling in local affairs and imposing burdens on individual land owners to advance a general objective. In the case of the San Juan Islands, we have yet to see any conclusive evidence that our current land use regulations and community culture of conservation is not working. Nevertheless, the PSP Action Agenda continues to include items focused on interfering in local policy development. The PSP should identify the problems with specificity before concluding that a region-wide power grab is necessary or appropriate.
5. The PSP appears to believe that we should seek to arrest the process of evolution, only reluctantly conceding that “Puget Sound will no longer fluctuate within a definable envelope of historical variability.” Such an approach reveals a shocking lack of confidence in the resilience of nature. We agree that using historically defined conditions as the target for conservation and restoration may be inappropriate, impossible, and possibly (although we agree that the science unclear) counter-productive in the long term. As you note:

Human infrastructure, habitats, and biological communities will be influenced by these changes [population and climate change], **with both positive and negative effects** on current species and the chances for colonization by new species, including pathogens and parasites.

PSPSSP at 14 (emphasis added). We support efforts to control identified pathogens and parasites, but we have not been shown any evidence that increased restrictions on family homes out in the woods is necessary toward that end.

6. The PSP's nonchalance in concluding that: "Some policy decisions can proceed despite relatively high scientific uncertainty, while others may require additional scientific understanding before decisions can be made," PSPSSP at 15, is of great concern to us as long as any regulatory or local policy items remain in the PSP Action Agenda. Our concern is heightened by the expansion of the PSP's focus to now include upland areas as well as the shoreline and shorelands. PSPSSP at 11.
7. The desire to "reduce opportunities for 'dueling science,' PSPSSP at 32, is concerning because only through a robust process of challenged conclusions and hypotheses can we hope to avoid groupthink and the effect of years of bias favoring ever increasing land use regulation.
8. The statement that "the Science Panel shall act as an advocate for science and science training in Washington State" is ambiguous in the context of this document. We support general science training and education and would support advocacy toward that end. However, to the extent that "science" means any particular finding or conclusion, we believe that the Science Panel should maintain objectivity and neutrality in debates regarding science and not become an "advocate" for particular scientific or policy positions.
9. The PSP continues to express a very black-and-white view of the impact of people on the environment. PSPSSP at 40 (first full bullet). What about neutral activities like single family homes out in the woods? The assumption seems to be that any human habitation degrades the environment. We submit that People are not some outside threat to the ecosystem and that this conclusion is inconsistent with the recognition of man as part of the Salish Sea ecosystem.

* * *

Thank you for the opportunity to comment on the PSPSSP. The Common Sense Alliance looks forward to the working with you to promote appropriate process and policy going forward. We support efforts to preserve and restore the Puget Sound, but will work to assure that the PSP does not allow the ends to justify inappropriate means or the abrogation of property rights. Perhaps most important, we urge the PSP to honor and respect "Washington's long tradition of limiting the power of state government and

deferring important decisions to local authorities.” PSPSSP at 13. This is absolutely critical if we are to retain the community spirit that is cherished in San Juan County and many rural communities around the Salish Sea.

Sincerely,

A handwritten signature in black ink, appearing to read "Timothy P. Blanchard". The signature is fluid and cursive, with the first name being the most prominent.

Timothy P. Blanchard
Vice President, CSA

Puget Sound Partnership Strategic Science Plan

January 2010 Review Draft

**comments provided by: Dr. Kathleen Wolf, Ph.D., Research Social Scientist; University of Washington, College of the Environment; US Forest Pacific Northwest Research Station
April 6, 2010**

Thank you for the opportunity to review this landmark document. It is a significant blueprint for a comprehensive science approach for a major resource system in the Pacific Northwest, and nation. The document represents the culmination of a unique participatory process to determine a complete set of scientific purposes and actions that will contribute to Puget Sound recovery.

I suggest that the Plan can move one more step – to more purposefully include social science as part of the science activities.

There is an important distinction to clarify within the plan. The plan now certainly includes human health and well-being as indicators or outcomes of recovery progress. And that is essential. But the plan does not acknowledge that the science of human systems is an important component of the *process* of ecosystem recovery.

There are teasers that imply that social science will (and should) be included in the broad range of analytic activities to improve Puget Sound. Examples are the 4th paragraph of the Executive Summary, 2nd paragraph of p. 5, and last paragraph of p. 23.

And yet, when the document turns to specifics of science activity (starting with Section 3) the text continues to call out the primacy of ecosystem and ecological science activity to inform social systems, such as policy. It is not acknowledged that the process of policy making and implementation are also researchable situations. A presentation of adaptive management could be interpreted to suggest coupled human/natural systems sciences, but particular phrasing and word use reinforce that biophysical sciences are the crux of ongoing management assessment.

This plan has matured in concept and scope; I believe that there is now opportunity to incorporate a more thoughtful treatment of social science for both process and outcomes of Puget Sound recovery. There is now little discussion of the conceptual frameworks of social science that could be applied to Puget Sound recovery. The work of Elinor Ostrom and colleagues is one example of social science application, and has been recently acknowledged with a Nobel prize.

As an example, the Science Capacity Building section (4.3) largely focuses on ecosystem science. 4.3.4 does indeed acknowledge several key research questions that pertain to social systems, but such questions are not operationalized in the document in the equivalent degree of emphasis that ecosystem sciences questions are portrayed.

Also, the last section of the plan, 4.6, presents the activities of Education and Outreach from a normative expectation. Yet these very processes of knowledge exchange are the types of activities that raise important questions (that can be framed as empirical/analytic inquiry) about the extent, effectiveness, and consequence of outreach and science communications in society.

In summary, the social sciences can certainly contribute understandings of recovery outcomes with regard to human populations and communities, with special attention to human health and well-being. Just as important is the recognition that the path to recovery entails complex human systems and that analytic approaches can be incorporated into better understanding on policy, regulatory, and educational interventions. This would be the social science equivalent to the interim ecosystem assessments modeled

by the *Open Standards for the Practice of Conservation*. Such an outlook is especially necessary given the urbanized condition of much of the Puget Sound basin, and associated complexity of the social systems that have consequences for the Sound.

Again, thank you for the opportunity to comment. Please feel free to call on me if you'd like additional information or clarification about my comments.

----- Forwarded Message

From: Kristin B Byrd <kbyrd@usgs.gov>

Date: Wed, 24 Mar 2010 15:08:02 -0700

To: actionagenda <actionagenda@psp.wa.gov>

Cc: Bill Labiosa <blabiosa@usgs.gov>

Subject: Comments on the PSP Strategic Science Plan

I am currently a team member on the USGS Puget Sound Ecosystem Portfolio Model project, and I was asked to provide comments on the Strategic Science Plan document.

My main comments are related to the organization and interrelationships among the six science program elements: performance management, engagement between science and policy, science capacities, synthesis and communication, peer review, and education and outreach.

It would be helpful to have an overall synthesizing diagram demonstrating how progress within one element can inform, support, or direct work being conducted under another element. For example, initial planning documents that identify environmental problems and conservation goals can drive the direction of research priorities. Resulting high quality research can in turn guide refinement of conservation and restoration strategies. In addition high quality data is the basis of successful education and outreach programs. So overall the progression of science capacities and engagement between science and policy is interdependent.

This concept may be found within the text of the document, but a diagram would be helpful for illustrating these connections.

Kristin Byrd

Kristin Byrd, Ph.D.
Western Geographic Science Center
U.S. Geological Survey